12/13/16

"Champions keep playing until they get it right."-Billie Jean King

HW: "Solving Higher Degree Polynomials" #8-20 even
Test 2 on Tuesday 12/20

AIM: How do we solve higher degree polynomials?

Warm Up:

1) Solve by completing the square : $3x^2 + 1 = 2x$

$3x^2 - 2x + 1 = 0$
$-1 \quad -1$

$\frac{3x^2}{3} - \frac{2x}{3} = -\frac{1}{3}$

$x^2 - \frac{2}{3}x + \boxed{\frac{1}{9}} = -\frac{1}{3} + \boxed{\frac{1}{9}}$

$-\frac{2}{3} \div 2 = -\frac{2}{6} = -\frac{1}{3}$

$\left(-\frac{2}{6}\right)^2 = \frac{4}{36} = \frac{1}{9}$

$\sqrt{\left(x - \frac{1}{3}\right)^2} = \sqrt{-\frac{2}{9}}$

$-\frac{1}{3} + \frac{1}{9}$
$-\frac{3}{9} + \frac{1}{9} = -\frac{2}{9}$

$x - \frac{1}{3} = \pm\sqrt{\frac{-2}{9}}$
$+\frac{1}{3} \quad +\frac{1}{3}$

$x = \frac{1}{3} \pm \sqrt{\frac{-2}{9}}$

$x = \frac{1}{3} \pm \frac{i\sqrt{2}}{3} \Rightarrow \frac{1 \pm i\sqrt{2}}{3}$

Exercises:
On a ***SEPARATE SHEET OF PAPER,*** find:

(a) the complete factorization of $p(x)$. Ex: $(x+2)(x-3)(x+1)$

(b) The complete solution set for $p(x)$. Ex: $x=-2, 3, -1$

1. $p(x)=x^4-13x^2+36$ (A) (M)

Like: $x^2-13x+36$

$P(x)=(x^2-9)(x^2-4)$

a) $P(x)=(x+3)(x-3)(x+2)(x-2)$

b) $x=-3, 3, -2, 2$

3. $p(x)=(x^2+5x-7)(x+2)$

a) $P(x)=(x^2+5x-7)(x+2)$

b) $x=-2, \frac{-5\pm\sqrt{53}}{2}$

Quad Formula

$x=\frac{-5\pm\sqrt{(5)^2-4(1)(-7)}}{2(1)}$

$x=\frac{-5\pm\sqrt{53}}{2}$

5. $p(x)=x^5-12x^3+32x$

2 is half of 4 so we can use AM Method

a) $P(x)=x(x^4-12x^2+32)$

$P(x)=x(x^2-4)(x^2-8)$

$P(x)=(x)(x-2)(x+2)(x^2-8)$

b) $x=0, 2, -2, \pm 2\sqrt{2}$

$x^2-8=0$

$x^2=8$

$x=\pm\sqrt{8}$

$x=\pm 2\sqrt{2}$

$\sqrt{8}$

$\sqrt{4}\sqrt{2}$

$2\sqrt{2}$

9. $p(x)=(x^2+9)(x+3)$

a) $P(x)=(x^2+9)(x+3)$

b) $x=-3, \pm 3i$

$x^2+9=0$

$x^2=-9$

$x=\pm\sqrt{-9}$

$x=\pm 3i$

15. $p(x) = 16x^4 - 1$ ← DOTS

a) $P(x) = (4x^2+1)(4x^2-1)$

$P(x) = (4x^2+1)(2x-1)(2x+1)$

$2x-1=0$, $2x=1$, $x=\frac{1}{2}$

$2x+1=0$, $2x=-1$, $x=-\frac{1}{2}$

$4x^2+1=0$, $4x^2=-1$, $x^2=-\frac{1}{4}$, $x=\pm\sqrt{-\frac{1}{4}}$, $x=\pm\frac{1}{2}i$

b) $x=\pm\frac{1}{2}i, \frac{1}{2}, -\frac{1}{2}$

17. $p(x) = x^3 + 6x^2 + 11x + 6$ (hint: -1 is one of the roots)

$(x+1)$ is a factor

$$\begin{array}{r} x^2+5x+6 \\ x+1 \overline{)\, x^3+6x^2+11x+6} \\ -(x^3+x^2) \\ \hline 5x^2+11x \\ -(5x^2+5x) \\ \hline 6x+6 \\ -(6x+6) \\ \hline 0 \end{array}$$

a) $P(x) = (x+1)(x^2+5x+6)$

$P(x) = (x+1)(x+3)(x+2)$

b) $x = -1, -3, -2$

19. $p(x) = x^3 - x^2 - 8x + 12$ (hint: -3 is one of the roots)